

REMARKS

The applicant respectfully requests reconsideration in view of the following remarks.

The applicant appreciates that the Examiner has withdrawn most of the previous rejections but has maintained the following prior art rejection. Claims 27-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al. (Proceedings of Solar Forum 2001) in view of Vogl (USPN 4,657,741). The applicant respectfully traverses this rejection.

Again as stated in the applicant's previous amendment, the German counter part of Vogl is cited at page 14, line 2 of the specification. The Examiner at the bottom of page 5 of the final Office Action indicated that Wu did not show the use of ionic liquids as the heat transfer medium in a reactor.

Wu describes the use of ionic liquids as liquid storage media which can replace thermal oil or molten salt for storing solar energy, as they fulfill main technical requirements for liquid storage media and heat transfer fluids, including high decomposition temperature, wide temperature range for liquids, high density, high heat capacity, low viscosity and low vapor pressure (see Wu, page 6, paragraph no. 6). Nevertheless, as the Examiner has correctly acknowledged at page 5 of the final office action, Wu does not give any hint or show the use of ionic liquids as heat transfer fluid in a reactor. Furthermore, Wu does not give any hint for the use of ionic liquids as heat transfer fluid in indirect introduction or removal of heat into or from a reactor, especially a shell-and-tube reactor or a reactor equipped with heat exchange plates.

Vogl, on the other hand, while describing a reactor with a contact tube bundle. However, Vogl is silent about the use of ionic liquids as heat transfer medium therein.

A statement that modifications of the prior art to meet the claimed invention would have been “obvious to one of ordinary skill in the art at the time the invention was made” because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See MPEP § 2143.01 IV. “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396 (2007) quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Furthermore, the Examiner cannot selectively pick and choose from the disclosed parameters without proper motivation as to a particular selection. The mere fact that a reference may be modified to reflect features of the claimed invention does not make the modification, and hence the claimed invention, obvious unless the prior art suggested the desirability of such modification. *In re Mills*, 916 F.2d 680, 682, 16 USPQ2d 1430 (Fed. Cir. 1990); *In re Fritch*, 23 USPQ2d 1780 (Fed. Cir. 1992). Thus, it is impermissible to simply engage in a hindsight reconstruction of the claimed invention where the reference itself provides no teaching as to why the applicant’s combination would have been obvious. *In re Gorman*, 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991).

The applicant believes the argumentation of the Examiner is based on hindsight reconstruction because the two fields of use, while both implying thermal properties of a liquid, are completely different: the thermal energy generated or required by a chemical reaction which has to be removed or supplied by a heat transfer medium varies in much larger limits compared to the solar energy which, in addition, is always heat generating and never requires a cooling.

Wu states under the heading “Abstract”,

“feasibility of ionic liquids as liquid thermal storage media and heat transfer fluids in SOLAR thermal power plant was investigated.”

(emphasis added)

Wu further stated under the heading “Introduction”

Solar energy is the most abundant energy source on the earth....

Because the solar energy availability depends on time, weather condition, and latitude, and the electricity demand varies with time, the energy originally from solar energy needs to be stored. This energy can be stored as thermal energy or electricity, but storage in thermal energy is considered the more economic method.

Currently thermal oil and molten salt are used as liquid storage media. The main problems for oil media are the low decomposition temperature (e.g. 300 °C) and for molten salt media it is its high melting point (e.g. 220 °C). (emphasis added).

When the person of ordinary skill in the art is reading Wu, that person realizes that Wu is only related to solar energy and not the thermal energy generated or required by a chemical reaction as required by the applicant’s claimed invention.

Moreover, the quantities of heat transfer medium required in an industrial reactor, such as a shell-and-tube reactor or a reactor with thermo-plate modules, especially if the energy of the chemical reaction to be removed is high, are incomparable larger. Further, taking into consideration the higher costs for ionic liquids compared to commercial heat exchange media as molten salts or thermal oils, a person of ordinary skill in the art would not have thought of replacing the extremely large quantities thereof needed in the large scale reactors.

In addition there is a considerable improvement in the isothermal operation of the reactor over its entire cross section due to the higher heat capacity of the ionic salt compared to classical salt melt of potassium nitrate and sodium nitrite. The better isothermal operation results in a reduced maximum hot spot temperature difference between for example individual reaction tubes in a shell-and, tube reactor from about 15°C to about 10°C, as explained on page 14, line 13 to page 15, line 18 of the specification of the present application. Of course, a comparable improvement is also obtained for a reactor equipped with heat exchange plates (see the specification at page 15, lines 16-19).

Moreover, as also explained at page 14, line 13 to page 15, line 18 of the specification, the use of ionic liquids as heat exchange medium in a reactor results in a considerable saving in the power required by the pumps, and in addition, it is not necessary to take care for specific arrangement of pumps, wherein contact of the heat exchange medium with the bearing crease of the pump is avoided, because of the generally non-toxic and non-flammable properties of ionic liquids.

For the above reasons, the above properties are not relevant for the use of ionic liquids in solar cells as described in Wu. Wu does not give the person of ordinary skill in the art any motivation to the use the ionic liquids in a completely different use (in chemical reactors). For the above reasons, this rejection should be withdrawn.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

A one month extension of time has been paid. Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 03-2775, under Order No. 13156-00027-US from which the undersigned is authorized to draw.

Respectfully submitted,

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